Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD

CONTOUR FARMING

(Ac.)

CODE 330

DEFINITION

Tillage, planting, and other farming operations performed on or near the contour of the field slope.

PURPOSES

To reduce sheet and rill erosion.

To reduce transport of sediment and other water-borne contaminants.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on sloping land where crops are grown.

Contour farming is most effective on slopes between 2 and 10 percent. This practice will be less effective in achieving the stated purpose(s) on slopes exceeding 10 percent and in areas with 10-year-frequency, single storm EI values greater than 140. The practice is not well suited to rolling topography having a high degree of slope irregularity because of the difficulty meeting row grade criteria. (EI = total storm energy times the maximum 30-minute intensity).

CRITERIA

General Criteria Applicable to All Purposes

Minimum Row Grade

Row grades for soils with slow to very slow infiltration rates (soil hydrologic groups C or D), or for crops sensitive to ponded water conditions for periods of less than 48 hours, shall be designed with positive row drainage of not less than 0.2 percent on slopes where ponding is a concern.

Maximum Row Grade

The row grade shall be aligned as closely as possible to the contour to achieve the greatest erosion reduction. The maximum grade of rows shall not exceed 2 percent or one half of the up and down hill slope percent used for erosion prediction, whichever is less. Up to 3 percent row grade may be permitted within 150 feet of the approach to a *grassed waterway, field border* or other stable outlet.

Headlands or end rows that are steeper than the maximum row grade criteria stated above shall have a cover-management condition no greater than 3 or established to permanent field borders. [Cover-Management Conditions are described in Chapter 6, *Predicting Soil*

Erosion by Water, A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE). 1997. USDA Agricultural Research Service, Agricultural Handbook No. 703].

When the row grade reaches the maximum allowable design grade, a new baseline shall be established up or down slope from the last contour line and used for layout of the next contour pattern. All tillage and planting operations will follow the contour line established.

Minimum Ridge Height

The ridge height shall be designed to reduce soil erosion compared to that of rows oriented up and down the slope. As a minimum, this practice shall be designed to achieve a 0.5-2 inch ridge height during the period of the rotation that is most vulnerable to soil erosion. Ridge height design will be determined using on site conditions and current erosion prediction technology approved for use.

The minimum ridge height criteria is not required for close-grown crops, such as small grains, when runoff is reduced compared to that of rows planted up and down the slope. As a minimum, plant height shall be at least 6 inches high and the spacing between plants within the row shall not be greater than 2 inches.

The minimum ridge height criteria is not required where the practice *residue management, no-till/strip-till* is used on the contour if at least 50 percent surface residue is present between the rows after planting.

Critical Slope Length

A contour farming layout shall not occur on a hill slope that is longer than the critical slope length, unless supported by other practices (e.g., *terraces, diversions*) that either reduce slope length below the critical length or reduce overland flow velocities. Increasing residue cover and roughness will change the vegetative cover-management conditions and decrease overland flow velocities. Increasing roughness alone is not sufficient to reduce the critical slope length.

The computation of critical slope length shall be determined using approved erosion prediction technology such as the Revised Universal Soil Loss Equation (RUSLE). Information (tables) pertaining to the calculation of the critical slope length for various land slopes and hydrologic soil groups (for contour farming) is contained in the appendix of this standard.

Stable Outlets

All runoff from contouring shall be delivered to stable outlets, such as grassed waterways, field borders, water and sediment control basins, or underground outlets for terraces and diversions.

CONSIDERATIONS

Prior to design and layout, obstruction removal and changes in field boundaries or shape should be considered, where feasible, to improve the effectiveness of the practice and the ease of performing farming operations.

If using *residue management, ridge-till* on the contour, avoid crossing over ridged rows at correction areas. Consider sod turn strips if correction areas are unavoidable.

Ridge height may vary throughout the year as a result of tillage, planting, some harvest operations, hilling, row cultivation, and weathering. Use of the variable ridge height may be needed in some areas. The width of correction areas, and the distance between baselines, should be adjusted for equipment operation widths.

Grassed waterways, water and sediment control basins, underground outlets, or other suitable practices should be used to protect areas of existing or potential concentrated flow erosion.

There are several factors that impact the effectiveness of contour farming to reduce soil erosion. These factors include: 10-year storm EI_{10} value, ridge height, furrow grade, slope steepness, soil hydrologic group, cover and roughness, and the critical slope length. Cover and roughness, row grade, and ridge height can be influenced by management and provide more or less benefit depending on design.

Contour farming may need to be used in combination with other conservation practices to meet the goals of the conservation management system.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field according to the Criteria, Considerations, and Operation and Maintenance described in this standard. Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Perform all tillage and planting operations parallel to contour baselines or *terraces, diversions, or contour buffer strip* boundaries where these practices are used, provided the applicable row grade criteria are met.

Where *terraces, diversions, or contour buffer strips* are not present, maintain contour markers on grades that, when followed during establishment of each crop, will maintain crop rows at designed grades. Contour markers may be field boundaries, a crop row left untilled near or on an original contour baseline, or other readily identifiable, continuous, lasting marker. All tillage and planting operations shall be parallel to the established marker. If a marker is lost, re-establish a contour baseline within the applicable criteria set forth by this standard prior to seedbed preparation for the next crop.

Farming operations should begin on the contour baselines and proceed both up and down the slope in a parallel pattern until patterns meet. Where field operations begin to converge between two non-parallel contour baselines, establish a correction area that is in permanent sod, established to an annual close-grown crop, or is in cover-management condition 3.

Where contour row curvature becomes too sharp to keep machinery aligned with rows during field operations, establish sod turn strips on sharp ridge points or other odd areas as needed.

Renovate *field borders* as needed to maintain at least 65 percent ground cover. Maintain adequate field border width to allow farm implements room to turn.

Appendix to NRCS Field Office Technical Guide Standard Contour Farming (330) December 2002

TECHNICAL EXPLANATION
CRITICAL SLOPE LENGTH FOR CONTOUR FARMING

Background

The Kentucky NRCS state conservation practice standard for "Contour Farming" refers to critical slope length. The critical slope length for contour farming will be determined using approved erosion prediction technology. The Revised Universal Soil Loss Equation (RUSLE) is the approved erosion prediction technology. Critical Slope Length is affected by 1) hydrologic group, 2) 10-yr EI, 3) Cover Management Type, and 4) Percent Slope.

Design Considerations

A contour farming layout shall not occur on a hill slope that is longer than the critical slope length, unless supported by other practices (e.g., *terraces, diversions*) that either reduce slope length below the critical length or reduce overland flow velocities. Increasing residue cover and roughness will change the vegetative cover-management conditions and decrease overland flow velocities. Increasing roughness alone is not sufficient to reduce the critical slope length.

Purpose

These tables are provided so that the conservationist can determine the critical slope length for contour farming when planning a cropping system for sheet and rill erosion reduction.

Use of Tables

The tables on subsequent pages have been adapted for use in Kentucky. Tabular data appears for all four hydrologic groups, 10-yr EI's 60 through 100, management cover types 4 through 7, and slopes of 1 through 10 percent. The DOS Version of RUSLE 1.05q was used in the development of these tables. The scope of these tables exceeds the slope range where the practice is to apply. When reading from the table, it is intended that the value be used as a guide. In most cases, the national and state practice standard criteria that "the maximum grade of rows shall not exceed 2 percent or one half of the up and down hill slope percent used for erosion prediction, whichever is less" will be the limiting factor for determining if contour farming is applied**.**

Hydrologic Group "A"
Cover Management Type 7 – Clean-tilled, smooth, fallow

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	965	833	735	658
3%	717	601	529	458	410
4%	513	430	371	328	293
5%	395	332	286	253	226
6%	320	268	232	204	183
7%	267	224	194	171	153
8%	229	192	166	146	131
9%	200	168	145	128	114
10%	177	148	128	113	101

Hydrologic Group "A"
Cover Management Type 6 – No cover or minimal roughness or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	1000	1000	1000	1000
4%	1000	1000	1000	898	780
5%	1000	989	816	693	602
6%	1000	800	660	561	487
7%	846	669	552	469	407
8%	725	573	473	402	349
9%	632	500	412	350	304
10%	560	443	365	310	269

Hydrologic Group "A"
Cover Management Type 5 – Light cover or moderate roughness or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	1000	1000	1000	1000
4%	1000	1000	1000	1000	1000
5%	1000	1000	1000	1000	1000
6%	1000	1000	1000	1000	1000
7%	1000	1000	1000	1000	980
8%	1000	1000	1000	975	840
9%	1000	1000	1000	851	733
10%	1000	1000	897	753	649

Hydrologic Group "A"
Cover Management Type 4 – Moderate cover or rough or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	1000	1000	1000	1000
4%	1000	1000	1000	1000	1000
5%	1000	1000	1000	1000	1000
6%	1000	1000	1000	1000	1000
7%	1000	1000	1000	1000	1000
8%	1000	1000	1000	1000	1000
9%	1000	1000	1000	1000	1000
10%	1000	1000	1000	1000	1000

Hydrologic Group "B"
Cover Management Type 7 – Clean-tilled, smooth, fallow

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	808	699	618	556	507
3%	503	436	385	347	316
4%	360	312	276	248	226
5%	278	240	213	191	174
6%	225	194	172	154	141
7%	188	162	144	129	118
8%	161	139	123	111	101
9%	140	121	107	97	88
10%	124	107	95	86	78

Hydrologic Group "B"
Cover Management Type 6 – No cover or minimal roughness or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	959	830	734	659
4%	814	686	594	525	471
5%	628	529	458	405	363
6%	508	428	370	327	294
7%	425	358	310	274	246
8%	364	306	265	234	210
9%	317	267	231	204	184
10%	281	237	205	181	163

Hydrologic Group "B"
Cover Management Type 5 – Light cover or moderate roughness or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	1000	1000	1000	1000
4%	1000	1000	1000	1000	1000
5%	1000	1000	1000	943	842
6%	1000	1000	869	763	681
7%	1000	847	727	638	569
8%	871	725	623	546	487
9%	760	633	543	477	425
10%	673	560	481	422	377

Hydrologic Group "B"
Cover Management Type 4 – Moderate cover or rough or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	1000	1000	1000	1000
4%	1000	1000	1000	1000	1000
5%	1000	1000	1000	1000	1000
6%	1000	1000	1000	1000	1000
7%	1000	1000	1000	1000	1000
8%	1000	1000	1000	1000	1000
9%	1000	1000	1000	1000	1000
10%	1000	1000	1000	1000	955

Hydrologic Group "C"
Cover Management Type 7 – Clean-tilled, smooth, fallow

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	999
2%	677	595	533	484	445
3%	422	378	332	302	278
4%	302	265	238	216	199
5%	232	204	183	167	153
6%	188	165	148	135	123
7%	157	138	124	113	104
8%	135	118	106	96	89
9%	1	103	92	84	77
10%	104	91	82	75	68

Hydrologic Group "C"
Cover Management Type 6 – No cover or minimal roughness or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	948	862
3%	865	746	658	591	538
4%	619	534	471	422	385
5%	477	411	363	326	297
6%	386	333	294	264	240
7%	323	278	245	221	201
8%	276	238	210	189	172
9%	241	208	184	165	150
10%	214	184	163	146	133

Hydrologic Group "C"
Cover Management Type 5 – Light cover or moderate roughness or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	1000	1000	1000	1000
4%	1000	1000	1000	944	856
5%	1000	928	814	728	660
6%	876	751	659	589	534
7%	733	628	551	493	446
8%	628	538	472	421	382
9%	547	469	412	368	334
10%	485	415	365	326	295

Hydrologic Group "C"
Cover Management Type 4 – Moderate cover or rough or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	1000	1000	1000	1000
4%	1000	1000	1000	1000	1000
5%	1000	1000	1000	1000	1000
6%	1000	1000	1000	1000	1000
7%	1000	1000	1000	1000	1000
8%	1000	1000	1000	1000	928
9%	1000	1000	1000	897	810
10%	1000	1000	892	795	717

Hydrologic Group "D"
Cover Management Type 7 – Clean-tilled, smooth, fallow

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	928
2%	612	543	490	448	413
3%	381	338	305	279	257
4%	273	242	218	199	184
5%	210	186	168	154	142
6%	170	151	136	124	115
7%	142	126	113	104	96
8%	122	108	97	89	82
9%	106	94	85	78	72
10%	94	83	75	69	63

Hydrologic Group "D"
Cover Management Type 6 – No cover or minimal roughness or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	964	871	796
3%	776	675	601	543	496
4%	555	483	430	388	354
5%	428	372	331	299	273
6%	346	301	268	242	221
7%	289	252	224	202	185
8%	248	216	192	173	158
9%	216	188	167	151	138
10%	191	167	148	134	122

Hydrologic Group "D"
Cover Management Type 5 – Light cover of moderate roughness or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	1000	1000	1000	1000
4%	1000	1000	932	840	767
5%	934	810	719	648	592
6%	756	656	582	524	479
7%	632	578	486	438	400
8%	541	470	416	375	343
9%	472	410	363	327	299
10%	418	363	322	290	265

Hydrologic Group "D"
Cover Management Type 4 – Moderate cover or rough or both

10yrEI	60	70	80	90	100
Slope %					
1%	1000	1000	1000	1000	1000
2%	1000	1000	1000	1000	1000
3%	1000	1000	1000	1000	1000
4%	1000	1000	1000	1000	1000
5%	1000	1000	1000	1000	1000
6%	1000	1000	1000	1000	1000
7%	1000	1000	1000	1000	968
8%	1000	1000	1000	912	830
9%	1000	1000	886	796	724
10%	1000	889	784	704	641